

Curriculum Vitae

CAMERON C. ORR, P.E., CSP, CFPHS

CERTIFICATIONS

Mr. Orr is a Mechanical Engineer who has earned the following certifications:

- Mechanical Professional Engineer (P.E.) licensed in Utah, #8518218-2202
- Certified Safety Professional (CSP) from the Board of Certified Safety Professionals, CSP-35839
- Certified Fluid Power Hydraulic Specialist (CFPHS) from the International Fluid Power Society (IFPS), #22754
- Certified Mobile Crane Inspector from the Crane Institute of America, #17-1430 - Expired 4/27/2019
- Certified Lift Truck Operator Trainer from the Utah Safety Council, 2/13/2012
- Certified in Lockout/Tagout OSHA compliance from the Utah Safety Council, 3/16/2010

EDUCATION

Mr. Orr attended college at Brigham Young University-Idaho in Rexburg, Idaho where he earned his Bachelor of Science degree in mechanical engineering and graduated in December of 2007. While at BYU-Idaho, Mr. Orr took part in the local chapter of the American Society of Mechanical Engineers (ASME) serving as the Treasurer. Mr. Orr also worked as a computer lab assistant and teacher's aide, assisting other students in learning engineering concepts and answering their questions about the lesson material. He also received many scholarships, including multiple Mechanical Engineering Department Scholarships.

INTERNSHIP

As part of his bachelor's degree studies Mr. Orr completed a summer internship at B/E Aerospace in Marysville, Washington. B/E Aerospace was an after-market aircraft modification company. Mr. Orr worked on a team of engineers who were converting old passenger airplanes into cargo airplanes. His responsibilities on the team included using 3D CAD systems to model key frame structures of the airplane in question and then insert them into their proper positions in the overall model assembly. He also provided support to another engineer on the team in reviewing, converting and updating legacy 2D drawings of the airplane in question.

ENGINEERING WORK HISTORY

Skinner Construction

Prior to, and for a short time while working on his bachelor's degree, Mr. Orr worked for Hal Skinner Construction of Rigby, Idaho. Hal Skinner Construction is a concrete contractor specializing in pouring concrete foundations for homes, banks, and potato cellars. Mr. Orr worked as a laborer and assistant to the owner. As part of his duties he assisted the owner in laying out footing forms according to the building plan, determining the appropriate aluminum form sizes to use for constructing the walls, inserting anchor bolts into the wet concrete at the designated intervals, and driving the skid loader and other heavy equipment used on the job sites.

Sentient Corporation

While working on his bachelor's degree, and for a short time after graduation, Mr. Orr worked as an engineer-in-training for Sentient Corporation in Idaho Falls, Idaho. Sentient Corporation specialized in small business government contracts involving the analysis, diagnostics, and prognostics of mechanical bearings, such as ball bearings, roller bearings, and the like. Mr. Orr's work at Sentient Corporation included:

- bearing test monitoring

- preparing test fixtures for operation
- test fixture design
- test fixture fabrication
- safety shield design and fabrication
- equipment selection and purchasing
- inspection and documentation of tested bearings and grease using a microscope and camera
- writing reports

Alpine Engineering & Design, Inc.

Mr. Orr has worked as a mechanical engineer for Alpine Engineering & Design, Inc. (AED) in Alpine, Utah since February, 2008. During his time at Alpine Engineering he has earned his Professional Engineering license in the state of Utah, become a Certified Safety Professional, and become a Certified Fluid Power Hydraulic Specialist. Mr. Orr is also certified as a lift truck operator trainer and a Design Certifying Engineering (DCE) for hazardous material tanker trailers.

As part of AED's consulting engineering work Mr. Orr has worked on many design, analysis, testing, prototyping, and DCE projects. The following are some of the key areas and engineering projects Mr. Orr has worked on while employed at AED.

Aerial Lift Trucks

Mr. Orr has worked extensively in aerial lift truck design. This work has included designing aerial lifts from the ground up. He has done everything from designing and sizing components, running stress analyses, laying out the hydraulic circuit, specifying hydraulic motors and actuators, creating detailed drawings, and testing and troubleshooting prototype units.

Hazardous Material Tanker Trailers

Mr. Orr has also worked extensively with the hazardous material tanker trailer industry as a Design Certifying Engineer (DCE). His work included verifying compliance to the U.S. Code of Federal Regulations (CFR) and Department of Transportation (DOT) regulations regarding the repair and modification of hazardous material tanker trailers. He has also performed detailed analyses of full trailer designs to verify the strength of the trailer in various situations.

LNG Tank Testing

Mr. Orr has also done work at AED involving the testing of liquid natural gas tanks to verify compliance with Society of Automotive Engineers (SAE) standards. This included managing and performing the safe operation of drop tests and flame tests.

Video Wall Lift Design, Fabrication, and Installation

Mr. Orr has designed a unique, hydraulically operated lift for moving an 8 foot by 15 foot LED video wall and speakers from the basement, through the floor, to the main living room of a large residence. This project included designing the lift mechanism, designing the hydraulic system, fabricating the lift, and installing the lift at the residence. Mr. Orr personally did the majority of the design work, welding, assembly, and testing of the lift. He also oversaw and helped with the electronic controls design, machining, and installation.

Other Projects

Design Projects

- reverse engineering a **pick-up truck dump mechanism**
- designing **aerial lift trucks**, both modifying current models and designing new models from the ground up
- designing automated **refuse truck lifting arm** mechanisms
- reverse engineering a **refuse truck body**

- designing a **liftgate spring assist** mechanism
- design of **fiberglass boom molds** for making aerial lift truck booms
- designing **small consumer products** such as an emergency radio and a battery powered squirt gun with a back-pack water tank
- designing a **bicycle type device** for propulsion in water
- designing multiple iterations of a **modular mining equipment simulator room**
- designing the mechanical components of a **sample recovery, amplification and testing apparatus** for disease and diagnostic testing
- designing multiple iterations of a **hanging scaffolding** system

Analysis Projects

- utilizing finite element analysis (FEA) to analyze several **aerial lift** models for compliance to applicable ANSI standards
- analyzing several **spreader bar designs** for compliance to ASME Below the Hook (BTH) standards
- utilizing FEA to analyze **large personnel support structures** used for maintenance access to large aircraft
- utilizing FEA to analyze the design of a **chandelier** for strength and code compliance
- analyzing the design of **propane and diesel heater trailers** for compliance to U.S. DOT regulations
- utilizing FEA to analyze the design of a **rebar and scrap steel hauling trailer**

Testing Projects

- **drop testing** liquid natural gas (LNG) tanks from 10 ft and 30 ft to verify compliance with SAE J2343 standards
- **flame testing** liquid natural gas (LNG) tanks to verify compliance with SAE J2343 standards
- **cycle testing** tarping mechanisms, fiberglass booms, and trailer hitches
- running a **battery of tests on many household blenders** of different configurations

Prototyping Projects

- 3D printing scaled down parts of a large dragon statue
- utilizing 3D printed parts to prototype a bicycle type device for propulsion in water
- building prototypes and production models of a modular mining equipment simulator room

Design Certifying Engineer Projects

- over 30 projects involving the review of repairs and modifications to hazardous material tanker trailers to ensure compliance with U.S. DOT regulations
- assisting hazardous material tanker repair facilities in obtaining their ASME R-stamp certification that authorizes them to repair hazmat trailers
- reviewing and approving welding procedures used in the repair and modification of hazmat trailers
- performing axle load analysis for trucks and trailers to maximize payload by determining optimal mounting position of hazmat tanks and axles
- running fill level calculations in order to create fill level calibration charts
- performing the LNG tank drop and flame tests noted in the testing section above

3D Scanning Projects

- using a Faro brand 3D scanner to get measurements of accident scenes and equipment
- utilizing point cloud software to knit 3D scans together and gather accurate measurements for analysis

EXPERT WITNESS WORK HISTORY

Mr. Orr has been retained as an expert in product liability cases. As part of his work as an expert he has performed inspections and written detailed reports. Mr. Orr has also testified in court as a fact witness.

As part of his work at Alpine Engineering, Mr. Orr has assisted the owner and president, Mr. Fred P. Smith, with his work as an expert witness. This work involved reviewing documents and helping to prepare reports for product liability and patent lawsuits where Mr. Smith was retained as the technical expert. Mr. Orr has also assisted Mr. Smith with many tests and inspections in connection with these lawsuits.

Mr. Orr has worked on the following expert witness projects:

- rear loader garbage truck container swinging into operator (multiple cases of similar circumstances)
- vacuum truck lid explosive decompression killing the operator
- hand caught in poorly designed home-use concrete mixer
- belly-dump trailer doors crushing the operator's legs
- laundry rack falling off a liftgate and crushing the operator
- rolling pallet rack braking system failure
- fatal dump truck brake booster repair failure
- horizontal boring machine turnover
- construction elevator control system failure
- refuse truck packer panel track failure
- box trailer wall construction patent suit
- ventilation hood installation failure
- air pressure in a hydraulic cylinder causing fatal damage to repairman
- small track-hoe tip over
- fatal folding chair seat failure
- tilt-bed tow truck operator error
- rough-terrain forklift tip over
- fatal hydraulic cylinder rupture
- scissor lift crushing operator
- fatal farm tractor transmission failure
- skid steer body motion crushing operator's feet
- visibility issues of heavy equipment causing fatal rollover
- inadequate forklift wheel guard causing foot injury
- inadequate blender component suit involving hundreds of tests on blenders
- shaving razor patent suit
- farm sprayer tractor visibility issues causing motorcycle crash
- fatal large glass sheet hauling trailer structural failure
- inadequate bulldozer safety systems allowing fatal operator motion while the equipment is moving
- essential oil diffuser patent suit
- hand tool patent suit involving destructive strength testing of a hand tool
- wheel chock mold design IP infringement and breach of contract
- fatal forklift impingement
- arm crushed and burned when caught in packaging machine
- multiple patent suits surrounding containers for hauling sand

PUBLICATIONS

Mr. Orr has coauthored a white paper titled "An Engineering Guide for Trailer Safety Chain Installation, Attachment and Use", published in 2012.

NON-ENGINEERING WORK AND CERTIFICATION

While working at Alpine Engineering, but independent of his work there, Mr. Orr also became a licensed Outdoor Fireworks Display Operator in the state of Utah. This license allows Mr. Orr to be in charge of the setup, safe operation, and clean up of professional fireworks displays. Mr. Orr has assisted with over 38 shows, primarily through Vortex Fireworks Productions of Salt Lake City, Utah. He has personally been the "Head Pyro" for over 14 shows.